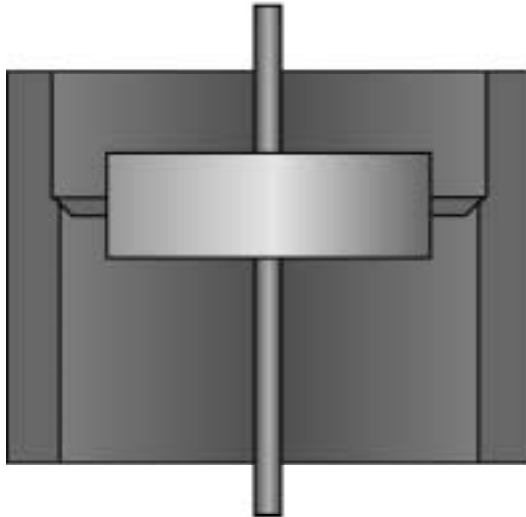


VLS: Umbilical Cable/EMS Cavity

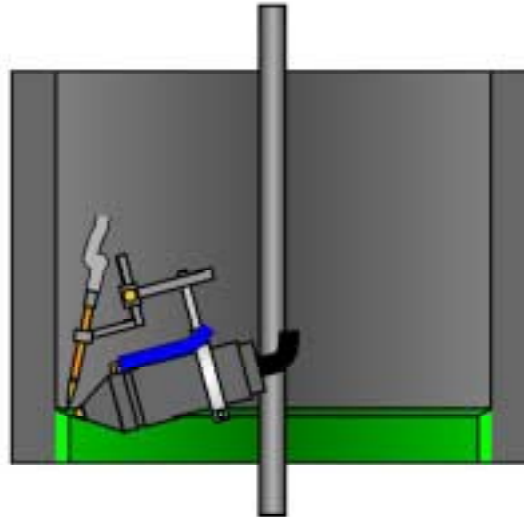


Schematic of Repair Operations

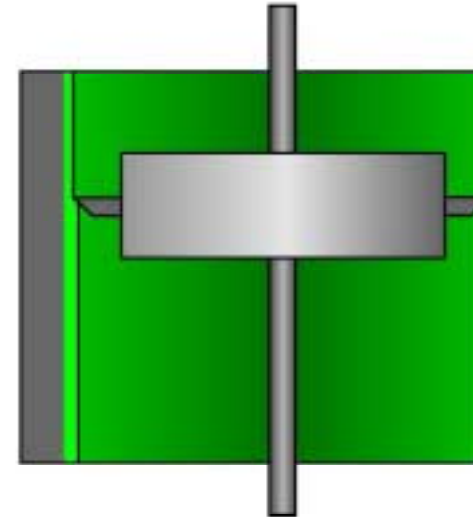
Cut Away Off Chemistry
Material



Laser Clad
New "On Chemistry"
Material



Final Machine
To Dimensions



- Performed site visit (Subase Pearl Harbor) – interviewed tech and operational personnel as to nature and frequency of problems
- Primary recommendation: shift priority to “pockets” in upper tube area
- Independent effort to secure license on patented powder/binder matrix suitable for all positions and complex geometries
- Completed project plan
- Fundamental metallurgical testing of laser cladding of HY materials with 625 has been performed





- Rust flakes are found to foul DPT sensor ports, cause malfunction
- “Class” problem – can occur without warning – impossible to fix “underway”

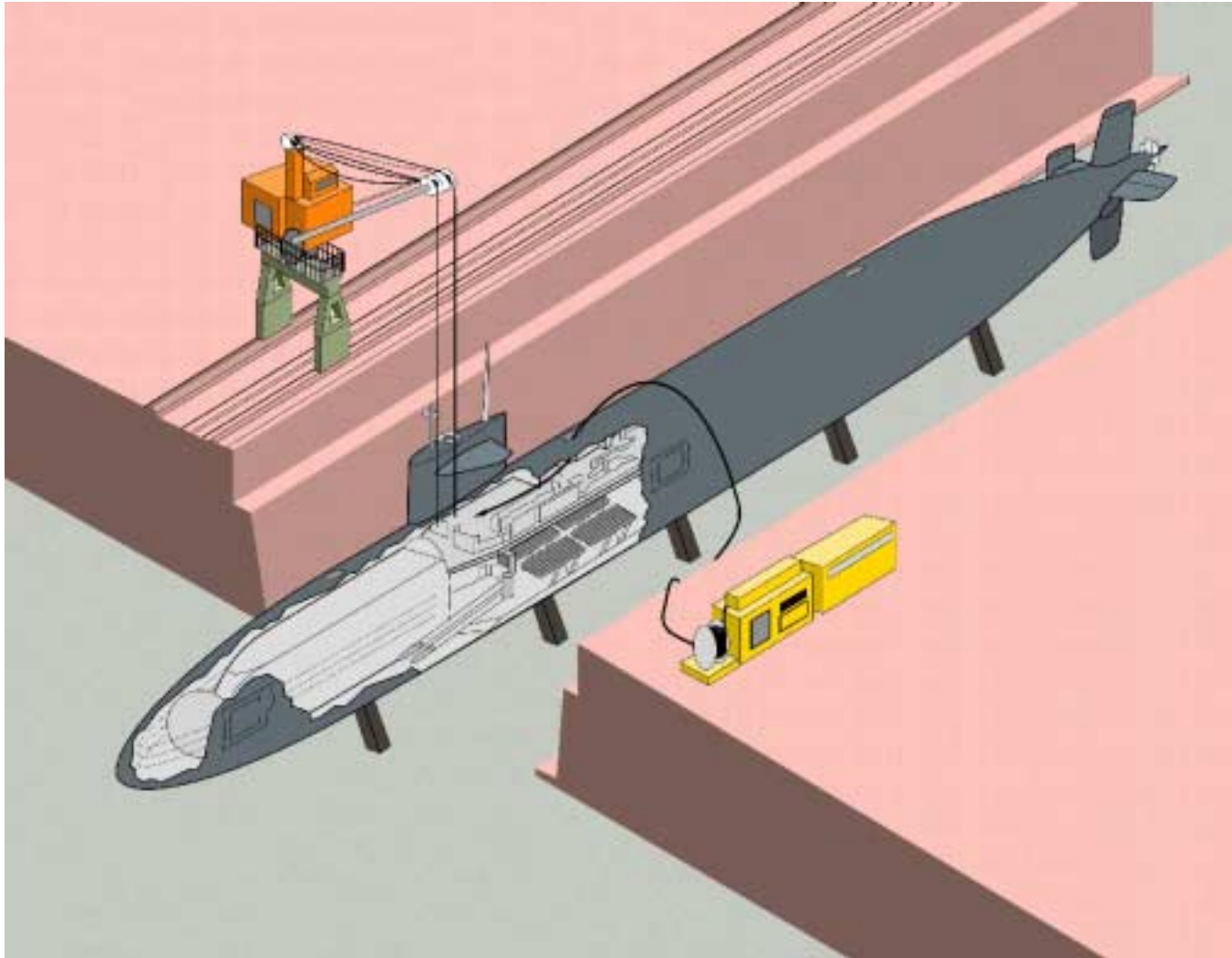
- Development of procedures and parameters to perform cladding in all positions and transitions between positions

- Modification of existing COTS hardware to perform cladding within VLS tube pocket areas



- Development of a system to perform “spot repairs”:
 - Incorporate a convertible motion device
 - Develop tool holders for welding and post-weld machining/grinding,
 - Quick change from welding head to grinding head without breaking the set-up.
 - Final machining/grinding head to machine surface finish to proper dimension.

Portable Nd:YAG Laser System (concept)





VLS Tube Repair



Performing Activity: ARL REPTECH

Primary Benefit: Lifecycle extension

Objective: Develop ND:YAG Repair process

System impacted: Vertical Launch System of 688i Class Submarines

Implementation: Puget Sound Naval Shipyard, Portsmouth Naval Shipyard and/or Pearl Harbor Naval Shipyard

Project Plan

- Perform detailed analysis of corrosion problem
- Develop process parameters for position
- Adapt COTS portable ID machining equipment
- Perform demo on VLS mockup at NUWC
- Go/No-Go Decision Point
- Develop Implementation Plan for fleet application

Payoff/ROI

- **Quantitative Benefit:** \$7M over 8 years
- **MANTECH ROI** = $\$2,318,751 / \$950K = 2.44:1$ (not including fleet time)
- **Qualitative Benefits:**
 - > Improved readiness
 - > Enhanced sailor quality of life (Retention)